

Appl. No. 10/773187
Amdt. Dated: January 30, 2007
Response to Office Action of November 7, 2006

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REMARKS/ARGUMENTS

Applicant thanks Examiner for the detailed Office Action dated November 7, 2006. In response to the issues raised, the Applicant offers the following submissions and amendments.

Amendments

Independent claims 1, 19 and 38 have been amended to highlight the features distinguishing them from the cited art. As a result of these amendments, claims 3, 21 and 40 have been cancelled. Independent claims 1, 19 and 38 have also been amended to define the small heater to nozzle spacing used in the present invention for greater ejection efficiency. The heater to nozzle spacing and its impact on printhead efficiency is described at page 20, line 25 to page 21, line 20.

Claims 1, 9, 11, 19, 28 30 and 38 have also been amended to address the typographical error and grammatical errors identified by the Examiner.

Accordingly the amendments do not add new matter.

Claims – 35USC§102

Claims 1, 19 and 38 *inter alia* stand rejected as obvious in light of US 4,870,433 to Campbell et al. Amended claims 1, 19 and 38 incorporate the features of now canceled claims 3, 21 and 40.

The cited reference does not teach a suspended heater or a heater to nozzle spacing of less than 50 microns. Accordingly, Campbell fails to support a §102 rejection of the amended independent claims.

Claims – 35USC§103

Claims 3, 21 and 40 were rejected as obvious in light of Campbell in view of US 6,680,668 to Gerber et al. As discussed above, these claims have been cancelled and their features incorporated into their respective independent claims. To further distinguish the invention, amended claims 1, 19 and 38 also define the close spacing of the bubble nucleating regions and the nozzle aperture.

Skilled workers will appreciate that the drop of ejectable liquid ejected from the nozzle will come from the layer of liquid between the bubble nucleating regions and the nozzle aperture. By keeping this layer of liquid thin, that is, by keeping the spacing between the nucleating regions and the nozzle small, the mass of liquid displaced by the bubble is less and so less energy needs to be applied to the bubble formation. However, drop misdirections from bubble irregularities are emphasized when the heater is close to the nozzle. The invention addresses this with the lateral spacing of the bubble nucleating regions.

The nucleation regions are laterally offset from the central axis of the nozzle, each region being offset an equal and opposite distance to each other. The nucleation regions are also

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close enough that their respective bubbles grow until they coalesce into one and eject the liquid. A single heater element with controlled bubble nucleation on either side of the central axis generates a broad bubble that shapes the pressure pulse so that droplet misdirection is reduced.

The cited references fail to disclose the suspension of the laterally spaced bubble nucleation regions less than 50 microns under the nozzle aperture. Nor do they recognize the efficient operation and accurate drop trajectories available to printhead constructed in accordance with the invention. Accordingly, amended claims 1, 19 and 38 are not an obvious derivation from the teachings of Campbell and Gerber. Likewise, none of the dependent claims are obvious in light of the cited references.

Conclusion

It is respectfully submitted that the Examiner's objections and rejections have been successfully traversed. Accordingly, favorable reconsideration is courteously solicited.

Very respectfully,

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